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COMMUNITY CLASSIFICATION OF WEST GULF COASTAL PLAIN BOG COMMUNITIES: A FLORISTIC ASSESSMENT

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ABSTRACT

Many community classifications separate West Gulf Coastal Plain hillside bogs, wetland pine savannas, and muck bogs. Based on floristic data, hillside bogs and wetland pine savannas are similar and muck bogs are different.

KEY WORDS: Hillside seepage bog, wetland pine savanna, pitcher plant bog, muck bog, West Gulf Coastal Plain

INTRODUCTION

In the course of our work on bogs in the West Gulf Coastal Plain (WGCP), we repeatedly have encountered the problem of classifying bog communities (Bridges & Orzell 1989; Diamond *et al.* 1987; Folkerts 1991; Louisiana Natural Heritage Program 1988; Peet & Allard 1993; Texas Natural Heritage Program 1993; Texas Organization of Endangered Species 1992; Weakley *et al.* 1998). Received opinion is that at least two communities are represented (Bridges & Orzell 1989; Diamond *et al.* 1987; Louisiana Natural Heritage Program 1988), but in the East Gulf Coastal Plain (EGCP), bogs (or their counterparts) are considered to be the same plant community or at least members of a plant community type (Folkerts 1991). However, Harcombe *et al.* (1993) cautioned that in the WGCP these assessments have preceded a thorough investigation, certainly a quantitative one.

Our studies of the floristics of hillside bogs (MacRoberts & MacRoberts 1988, 1990, 1991, 1992, 1993) and our cursory observations of wetland pine savannas, and savanna and muck bog descriptions in the literature (Bridges & Orzell 1989; Harcombe *et al.* 1993; Kral 1955; Lodwick 1975; Rowell 1949), have led us to reexamine the traditional bog/savanna classifications. The purpose of our research was not to

adjudicate on community classification, but to obtain floristic information about plant communities. To this end, we made year-round floristic surveys of muck bogs and wetland pine savannas (MacRoberts & MacRoberts 1998a, 1998b). Floristic lists from each site are directly comparable and therefore provide comparative information about communities.

METHODS

In the course of the past twelve years, we have developed total floristic lists for twelve hillside bogs on the Kisatchie National Forest, Natchitoches and Vernon parishes, Louisiana; two wetland pine savannas on the Big Thicket National Preserve, Hardin and Tyler counties, Texas; and two muck bogs on the Gus Engling Wildlife Management Area, Anderson County, Texas (MacRoberts & MacRoberts 1988, 1990, 1991, 1992, 1993, 1998a, 1998b). Using the lists of Bridges & Orzell (1989), Orzell (1990), Nixon & Ward (1986), and our own observations since 1993, we also have developed a plant list for Texas hillside bogs. This list centers on the Angelina National Forest in Angelina and Jasper counties. Although the list is not based on a year-long survey of a single site, it is probably fairly representative of a typical Texas hillside bog.

In addition to these data, there are variously complete floristic lists that allow some comparisons among bog types (Ajilvsgi 1979; Allen *et al.* 1988; Bridges & Orzell 1989; Kral 1955; Lodwick 1975; Nixon & Ward 1986; Orzell 1990; Rowell 1949; Streng & Harcombe 1982; Texas Natural Heritage Program 1993; Watson 1979, 1982).

There are many objective methods for classifying communities: multifactor ecological classification systems use both biotic and abiotic factors (Turner & Van Kley in prep.); others emphasize floristic data (Weakley *et al.* 1998). We have used a floristic approach, which harkens back to the European phytosociological tradition in which plant communities were recognized by their vegetation as a whole, of which some plants were deemed more sensitive expressions of a given relationship than others (Fauth *et al.* 1996; van der Maarel 1975; McIntosh 1975; Whittaker 1975; Wilson *et al.* 1996). Following the lead of Nixon & Ward (1986), we have used Sorensen's Index of Similarity, one of the older methods of community comparison (Sorensen 1948). The formula is $IS = (2C/A+B) \times 100$, where C is the number of species common to the two samples, A is the total number of species in sample A, and B is the total number of species in sample B. Interpretation is relatively simple: 100 means that the compared communities (or samples) have identical taxa, and 0 means that they have no taxa in common. Figures in between require some interpretation: the higher the number, the greater the similarity. We have found that the IS of samples of the same community ranges from about 55 to 60 and up. The criticism that the Index overvalues rare species is unjust (Southwood 1966); rather, the Index levels the field by not overemphasizing so-called "dominant" (large) generalists or otherwise conspicuous species. Further, the question addressed by the statistic is not whether or not there are different communities, but rather how similar the two samples are.

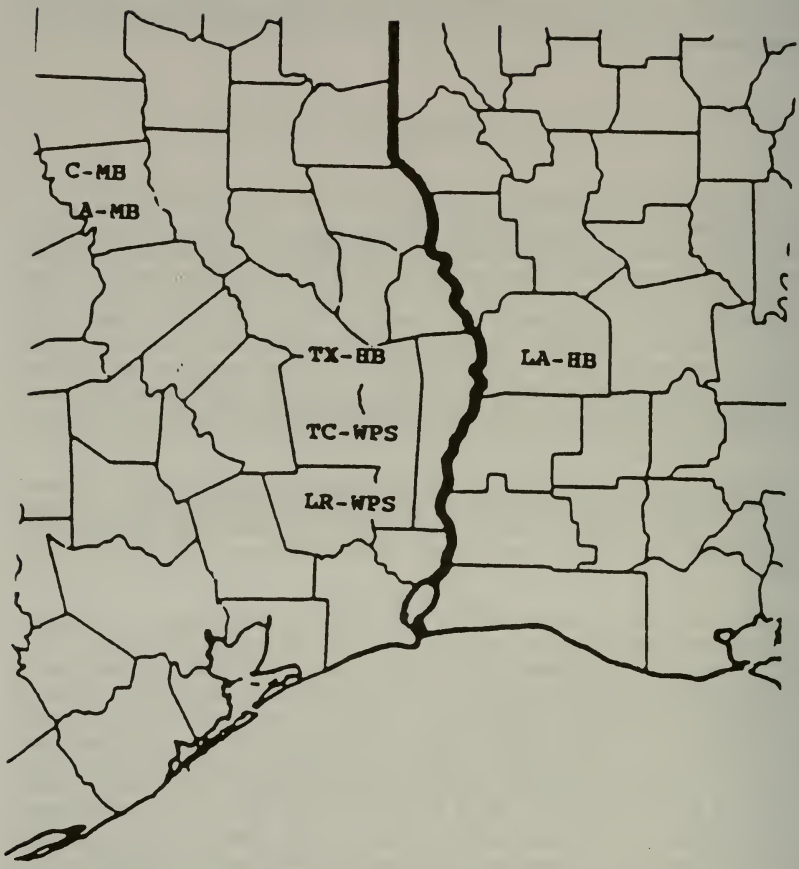

Figure 1. Distribution of study sites. See Table 1 for further locality information.

RESULTS

Using Sorensen's Index of Similarity, Table 1 compares the floristic similarity among two wetland pine savannas (LR-WPS and TC-WPS) (MacRoberts & MacRoberts 1998a), two muck bogs (A-MB and C-MB) (MacRoberts & MacRoberts 1998b), and two hillside bogs (LA-HB and TX-HB) (MacRoberts & MacRoberts 1993, unpublished observations; Orzell 1990; Nixon & Ward 1986). The six samples consist of between 105 and 131 species. Figure 1 shows the distribution of these sites.

Table 1. Comparison of bogs and savannas by Sorensen's Index of Similarity (IS). A-MB = Andrew's Bog, Gus Engeling Wildlife Management Area in Anderson County, Texas; C-MB = Chester's Bog, Gus Engeling Wildlife Management Area in Anderson County, Texas; LR-WPS = Lance Rosier Wetland Pine Savanna, Big Thicket National Preserve in Hardin County, Texas; TC-WPS = Turkey Creek Wetland Pine Savanna, Big Thicket National Preserve in Tyler County, Texas; LA-HB = Cooter's Hillside Bog, Kisatchie National Forest in Vernon Parish, Louisiana; TX-HB = Texas Hillside Bog, Angelina National Forest in Angelina and Jasper counties, Texas.

	A-MB	C-MB	LR-WPS	TC-WPS	LA-HB
C-MB	80				
LR-WPS	34	34			
TC-WPS	35	36	79		
LA-HB	43	45	66	69	
TX-HB	45	48	65	72	83

DISCUSSION

In this paper we have emphasized floristic data in the classification of bog communities. We do so not only because communities are about plants, but also because we had already collected complete floristic lists for hillside bogs. Comparisons of these plant lists show that hillside bogs and wetland pine savannas are basically the same floristically: at least in terms of total species. Muck bogs are distinct.

There is a literature with partial floristic lists for wetland pine savannas and hillside bogs. For example, the Texas Natural Heritage Program (1993) describes hillside bogs and wetland pine savannas as two communities ("Longleaf Pine-Beakrush Series" and "Sphagnum-Beakrush Series") and presents a short but essentially

identical plant list for each. The Louisiana Natural Heritage Program (1988) calls these two communities "Hillside Bog" and "Pine Savanna," but the lists of plants for the two is almost identical. Bridges & Orzell (1989) list the percent frequency of prevalent species for hillside bogs and for wet savannas. Of the 47 species listed in their wet savannas, 44 (94%) occur in hillside bogs (MacRoberts & MacRoberts 1988, 1990, 1991, 1992, 1993; Nixon & Ward 1986). Streng & Harcombe (1982) present a partial list of species for a wetland pine savanna in southern Tyler County that is basically identical with lists from hillside bogs farther north.

Bridges & Orzell (1989) make the point that species prevalence is different between hillside bogs and wetland pine savannas. We can say little about prevalence since we have studied only a few sites. But on the basis of unquantified observations, Bridges & Orzell are probably correct; variation in abundance is something that should be studied in the bog community complex.

We have emphasized floristics in these comparisons. Ecological classifications are beginning to be developed for WGCP plant communities, but these as yet do not include samples of all bog types (Harcombe *et al.* 1993; Turner & Van Kley in prep.; Van Kley in press). When more research has been completed, it will be interesting to see the similarities and differences among classifications that are based on different criteria.

Why hillside bogs and wetland pine savannas have been considered separate plant communities in the WGCP is not entirely clear, but there may be several reasons. One may be that the floristics of most WGCP plant communities is poorly known and quantitative data are usually unavailable. Consequently, comparisons between and among communities have remained largely subjective. Another factor is that single species are often used as community indicators. In the case of hillside bogs, the presence or absence of *Sarracenia alata* Wood. appears to be important in classifying sites. In the WGCP, *Sarracenia* drops out of the flora 80 to 100 km inland, south of which much of the wetland pine savanna occurs. However, many hillside bogs also lack *Sarracenia* (Hermann 1990, 1995; Kral 1955; MacRoberts & MacRoberts 1991); for example, only 22% of hillside bogs in Natchitoches Parish have pitcher plants; whereas over 90% of those in Vernon Parish do (MacRoberts & MacRoberts pers. obs). Yet, hillside bogs without pitcher plants are not otherwise floristically different from sites with pitcher plants (MacRoberts & MacRoberts 1991). In the post oak region of Texas, Kral (1955) studied bogs without pitcher plants; whereas those studied by Rowell (1949) and Lodwick (1975) had them; all these sites were floristically similar. Consequently, while it is interesting that *Sarracenia* drops out of the WGCP flora at the Beauregard/Calcasieu Parish line in Louisiana and at the Tyler/Hardin County line in Texas, the floristic complement typical of bogs remains. Apparently because pitcher plants extend all the way to the coast in the EGCP (Folkerts 1991), a hillside bog/wetland pine savanna distinction is not made for bog communities in that region. As Folkerts (1982:260) said of pitcher plant habitat, "bogs in areas of little relief are typically called savannas."

The following scheme approximates our floristic findings for bog communities in the WGCP:

WGCP Bog Communities
A. Bog -savanna

1. Hillside bog
2. Wetland pine savanna

B. Muck bog

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